Appalachian STATE UNIVERSITY BOONE, NORTH CAROLINA

What Is Sustainable Health (And Why You Need To Know)?

By: **Adam Hege**

Abstract

Currently, the world has a population nearing eight billion people, with projections for nearly ten billion by 2050. Many questions and concerns persist regarding how we will manage limited resources and take care of humanity, all while not further degrading the natural environment. In 2015, world leaders came together at the United Nations General Assembly and reached agreement on 17 Sustainable Development Goals (SDGs) for moving forward on tackling the complex challenges facing the world. Each of the lofty goals has a focus on improving the health and wellbeing of citizens around the world, while pursuing a more equitable distribution of resources to include: ending poverty in all forms; eliminating hunger and food insecurity through sustainable agricultural practices; reducing social inequities (education, gender, racial, occupational, etc.); and addressing environmental concerns (land, water, consumption/production) associated with climate change, among others.

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Sustainable Health What is Sustainable Health (And Why You Need to Know)?

Adam Hege

"Our challenge, our generation's unique challenge, is learning to live peacefully and sustainably in an extraordinarily crowded world. Our planet is crowded to an unprecedented degree. It is bursting at the seams. It's bursting at the seams in human terms, in economic terms, and in ecological terms."

Currently, the world has a population nearing eight billion people, with projections for nearly 10 billion by 2050. Many questions and concerns persist regarding how we will manage limited resources and take care of humanity, all while not further degrading the natural environment. In 2015, world leaders came together at the United Nations General Assembly and reached agreement on 17 Sustainable Development Goals (SDGs) for moving forward on tackling the complex challenges facing the world. Each of the lofty goals has a focus on improving the health and wellbeing of citizens around the world, while pursuing a more equitable distribution of resources to include: ending poverty in all forms; eliminating hunger and food insecurity through sustainable agricultural practices; reducing social inequities (education, gender, racial, occupational, etc.); and addressing environmental concerns (land, water, consumption/production) associated with climate change, among others. Each of these 17 SDGs have direct impacts with western North Carolina and the Appalachia region as a whole and provide direction moving forward. In this paper, I examine what the terms 'sustainable' and 'health' mean for the 21st century, the numerous connections between sustainability and human health, and the short-term and long-term challenges facing western North Carolina and the Appalachia region, which are intricately connected to sustainability and health. Lastly, I present principles and approaches from the fields of sustainable development, community development, and public health, which are grounded in the SDGs, that communities should seek to utilize in moving forward in the 21st century.

Introduction

A major topic of concern over the past couple of decades has been 'sustainability'. So, what does the concept of sustainability, which is floated around in a multitude of professional and academic disciplines, actually mean? The term 'sustainability' has been debated for numerous decades and, in fact, there is no universally agreed way of defining it. However, in general, when we explore the term through reason, evidence and experience, it is essentially the many processes that are taken to maintain a certain level, for both the present and future.1 It can apply to all of the various aspects of our human lived experience. Regarding the human and non-human world in which we live, most refer to sustainability as the many interlinked components (environmental, social, economic, and institutional) making up the world, and how each of these resources can be maintained to meet our basic needs over time.[2,3]

The research pertaining to sustainability and sustainable development has centered on the three pillars: economic, social, and environmental. Or, as John Elkington first said and many continue to call it: profit, people, and planet.[4,5] The basic premise

and challenge is: how do we as humans maximize economic growth and development in a socially responsible, equitable and inclusive way that does not harm our planet and environment, all while seeking to improve human life? Moreover, the follow-up question becomes: how do we accomplish all of this with our world nearing eight billion people, the vastly different needs and desires across the world, and governments and policymakers within and across countries largely differing on how we achieve global sustainability? Effective public policy, however, is crucial to achieving this equilibrium and a more just, sustainable world.

These concepts of sustainability are vital to the health of the global population. Health, which is complex, is defined by the World Health Organization as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[6] One's physical and mental health and well-being is the result of the physical environment, social and economic opportunities and experiences, human and health behaviors, health care and medical resources, and public policy.[7] When we examine health from a population or public health lens, we recognize that each of the three primary pillars of sustainability are critical for human health. The field of public health seeks to protect and improve the health of populations and communities through public policy recommendations and advocacy, health education and outreach, and epidemiological research and was simply defined by the Institute of Medicine in 1988 as what "we as a society do collectively to assure the conditions in which people can be healthy."[8] While many in the western world, and in particular the U.S., view health as a primarily medical-oriented issue, research has shown that medicine and clinical care only accounts for roughly 20 percent of human health. In reality, 80 percent of health outcomes is due to social determinants of health (income/socioeconomic status, etc.), health behaviors (which are largely driven by social/environmental factors), and the physical environment (see Figure 1).[9,10] benefits of resilience planning in WNC.

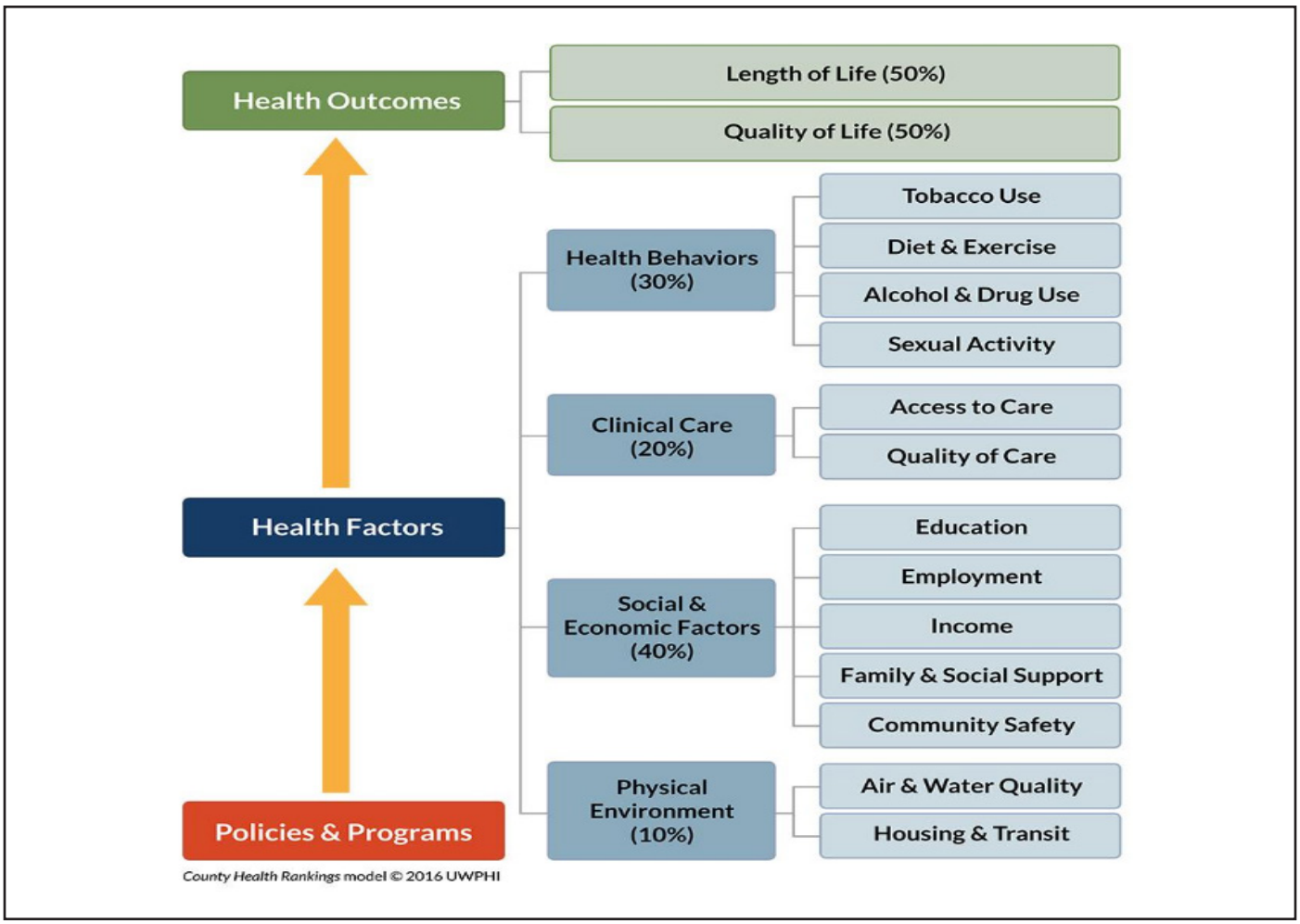
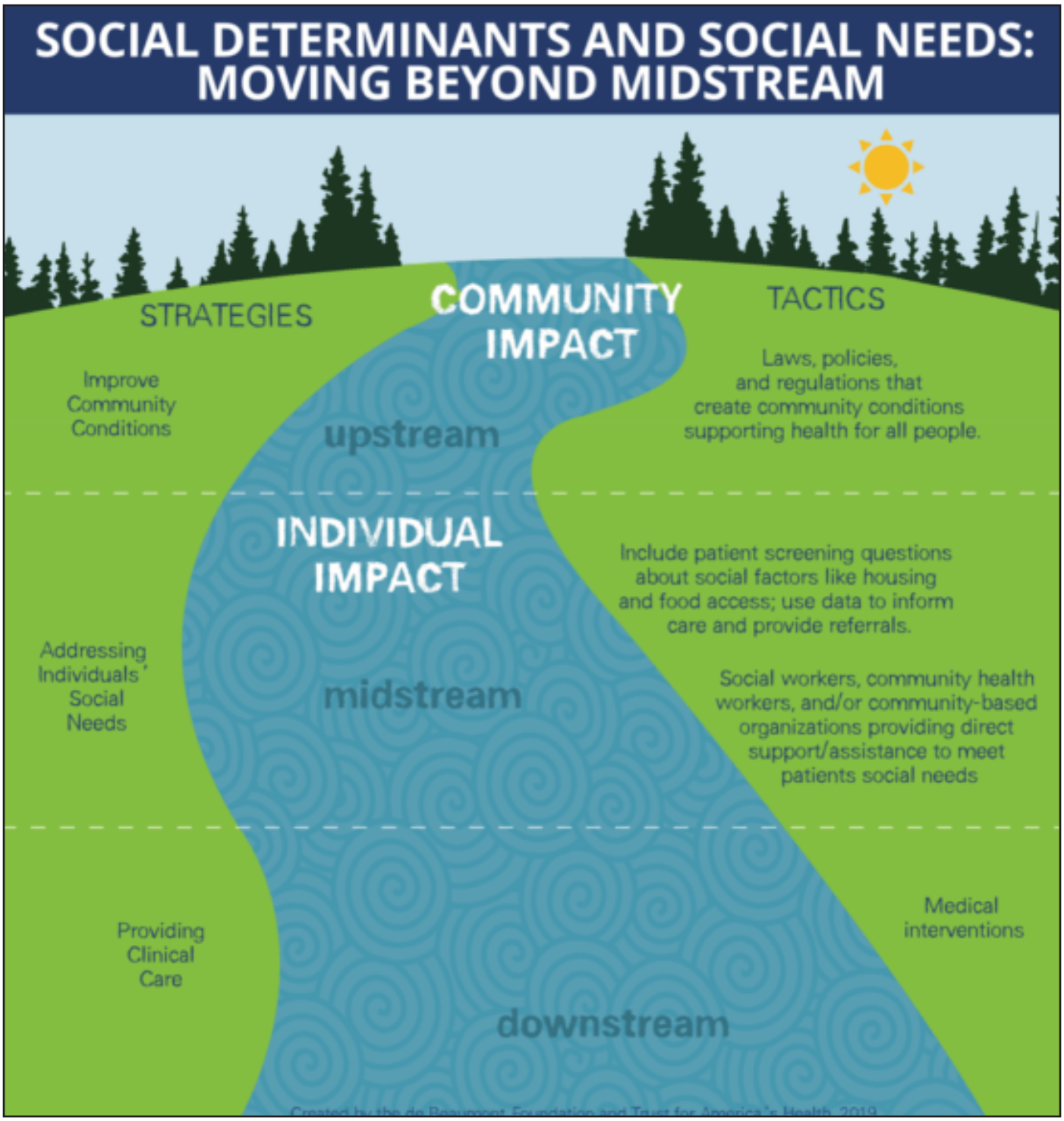


Figure 1. Determinants of health.

In the public health field, the 'stream' analogy (see Figure 2) of upstream, midstream, and downstream is often used to describe the determinants of health in relation to health outcomes, which is a visual representation of the 'driving forces' behind human health at both an individual and population level. The upstream impacts are the community and societal conditions (policies, laws, regulations); health promotion and social care (screenings, social work, behavior change) occur midstream; and, finally, clinical care and medical interventions are further downstream. In the United States, we spend the overwhelming majority of our budgets at all levels of government on the downstream factors and devote much less attention upstream and midstream; as a result, we spend a much greater percentage of our GDP on medical care than any other developed country and have among the worst health outcomes in return.[7,11]



When sustainability across all three pillars and an upstream public health approach is not the focus, the world and individual nations experience social, economic and environmental inequities that result in health disparities. Health disparities are defined by the National Institutes of Health as, "differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups (including gender, race/ethnicity, socioeconomic status, occupation, disability, geographic location, or sexual orientation."[12] The disparities in health are not happenstance but are societal injustices and often considered issues of morality, ethics, and human rights.[12-14] As such, there have been many calls from the fields of sustainable development and public health for a human rights approach as it pertains to health. The right to health was declared a human right in the Universal Declaration of Human Rights of 1948.[15,16] With the substantial health disparities and inequities across the world, government leaders from around the world met in September 2015 to establish a 15-year set of 17 Global Sustainable Development Goals (SDGs) with 169 targets for addressing and improving the economic, social, and environmental pillars.[17]

The broad overarching goals of the SDGs are all interconnected and seek to provide a "shared blueprint for peace and prosperity for people and the planet, now and into the future."[18] As seen in Figure 3 below, the 17 goals consist of: eradicating poverty; ending hunger; achieving good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; action on climate change; care of life below water; care of life on land; peace, justice and strong institutions; and partnerships for the goals. With the ambition of achieving these goals by 2030, countries around the world will have to make deep transformations in their policy agendas and the way financial resources are invested; in addition, it will require much data and science to inform solutions and to track progress.[19] Systems thinking and transdisciplinary approaches will be vital to the planning and implementation of policies and interventions across the SDGs.[20,21] A systems and transdisciplinary approach allows us to recognize the interconnections between all of the SDGs and social and environmental determinants of health and how interdependent each is on the other. In addition, it helps researchers and policymakers to account for the feedback mechanisms (both reinforcing and buffering) of the various factors involved.[22]

Figure 3. UN Sustainable Development Goals

With the SDGs being so complex, policymakers should seek multifaceted policies that address multiple goals simultaneously – one viable way, promoted by the public health field, is a health in all policies (HiAP) approach. This approach centers on the importance of public policy across all sectors (environment, social, economic, etc.) incorporating health and health outcomes in their decision-making.[23-25] In their 2019 paper, Sachs and colleagues[26] further provided a framework for countries to use as well as evidence-based examples to incorporate. Specific examples, among others, include: universal early childhood education; occupation-related social protections (living wage, anti-discrimination measures); expanded social safety net protections; universal health coverage; zero-carbon electricity generation; electrification and zero-carbon fuels; efficient and resilient agricultural systems; healthy food promotion/regulation; integrated land-use/water management; sustainable mobility and transport networks; and universal broadband internet access. Meanwhile, Fu's[27] group sought to simplify a similar systems approach that can be adapted to countries based on the surrounding context and addresses the 3C's: classification, coordination, and collaboration. Their framework recognizes that countries have different challenges and needs within their country – and, in addressing the SDGs at a global level, it is apparent that nations will have to work together.

The United States, just like other nations, has its unique contextual challenges rooted in the SDGs and one of the most consistent factors across the country is the role of place or geographic location. One specific region that gets a lot of attention for its worse health outcomes than the rest of the nation, is the Appalachian region.[28,29] The region includes 420 counties and spans 13 states, including the entire state of West Virginia.[30] Across Appalachia, much progress has been made over the last several decades, however, the Region still encounters lower incomes and higher poverty rates, high unemployment and underemployment rates, and lower educational attainment, when compared to the rest of the U.S, which are all critical upstream social determinants of health.[28] Concurrently, Appalachia performs worse on health measures to include, among others: physically and mentally unhealthy days; depression; mental health providers; obesity; physical inactivity; smoking; heart disease, cancer, and stroke mortality; healthcare access/primary and specialty care physicians; and years of potential life lost.[28] Moreover, the Appalachian region has been found to be experiencing drastically higher rates of "diseases of despair"[31] and ultimately "deaths of despair"[32], which are associated with the interconnectedness of economic challenges and income stagnation and mental health and substance abuse associated morbidity and mortality.

A major feature of Appalachia that is often identified as the root of the challenges are the high rates of rurality across the region. The Appalachian Regional Commission reports that 42 percent of Appalachia is deemed rural; whereas, only 20 percent of the national population lives in a rural setting.[30] However, research has found similarities in adverse health outcomes between rural and urban settings, with both doing worse than suburban areas.[33] Baciu and colleagues[34] suggest that rural areas tend to encounter distinctive characteristics that are associated with both the upstream factors and the health outcomes, which include: demographics featuring older populations, as younger populations generally move to cities for work and/or school; inefficiency in healthcare systems and the providing of services (hospital closures); evidence-based interventions and the allocation of governmental resources focused on urban areas; a lack of technological infrastructure; and place-based exposures and occupational risks.

To add to the mix of these challenges to sustainability and health, the world and U.S. currently finds itself in the worst global pandemic, COVID-19, that we've experienced in this generation. COVID-19 has forced us to examine many of these issues and has serious implications for our world moving forward. It has shown us that coordinated governmental action at all levels and collective action is needed when addressing society's most pressing social, health, environmental, and economic challenges that are all being brought to the forefront as a result of COVID-19.[22]

With this background and context, in the following sections I use the SDGs to provide a general overview of the challenges and opportunities facing Appalachia and provide recommendations. Along the way, I refer to the work presented by other authors in this volume and place an emphasis on western North Carolina and the High Country area. I provide some concluding remarks on how research and expertise from Appalachian State University can make a significant impact on improving the quality of

life in western North Carolina and beyond, through addressing the SDGs.

Overview of Sustainable Development and Public Health Challenges and Opportunities facing Appalachia and the High Country

It is recognized that each of the SDGs are inextricably linked and can either support or hinder the results of others. For the purposes of this paper, I have divided the SDGs into four categories to discuss the implications of each for Appalachia and specifically the High Country. The four areas include: social determinants of health/economic inequities; environmental determinants of health; governance/trust in institutions/assets/partnerships; and good health and well-being.

Social determinants of health/economic inequities

Across Appalachia, poverty and food insecurity and hunger are major issues. According to trend data from the 2014-2018 American Community Survey, the median household income across the region is 82.5% that of the U.S. general population ($49,747 vs. $60,293) and the poverty rate is 1.7% higher (15.8% vs. 14.1%).[35] Within those same data, however, it is found that Central and South Central Appalachia fare the worst, with the median household incomes being $36,993 and $46,669, respectively. The High Country portion of North Carolina (Alleghany, Ashe, Avery, Mitchell, Watauga, Wilkes, and Yancey counties), where Appalachian State University is located, falls within the South Central portion. When examining the recent Appalachian Health Disparities report[28], grocery store availability and food access are major barriers to health. Specifically, the report found that across Appalachia, there are 14% fewer grocery stores per 1,000 population when compared to the U.S.; and even more importantly, Southern Appalachia falls 24% lower than the national mark. When combining the economic issues and food accessibility and availability, the combination of increased poverty and food insecurity challenges are problematic and deserve much attention.

Specific to North Carolina, Roy and colleagues further found that the western North Carolina counties, which are located in South Central Appalachia, had a higher food insecurity prevalence, when compared to North Carolina as a whole.[36] When examining the High Country in the data from the 2020 County Health Rankings[37] found in Table 1, we see that median household income across the counties ranges from $39,700 to $48,500, all falling below the North Carolina average. An important note to make is that while Watauga County has a slightly higher income level, there is still great income inequality and disparity between the rich and the poor. Connected to the income data, across the counties (minus Watauga), there are much higher rates of childhood poverty, high levels of children eligible for free or reduced lunch, and increased levels of food insecurity. In their article in this volume, Gutschall[38] and her colleagues describe their work related to poverty alleviation and food insecurity/hunger in the High Country and the importance of community and academic university partnerships from Appalachian State University.

Additional Resources

https://www.hsph.harvard.edu/nutritionsource/sustainability/

https://www.paho.org/salud-en-las-americas-2017/?p=67

https://www.un.org/sustainabledevelopment/

https://www.ted.com/talks/michael_green_the_global_goals_we_ve_made_progress_on_and_the_ones_we_haven_t

https://www.youtube.com/watch?v=a5xR4QB1ADw

https://www.ted.com/talks/jude_wood_building_a_resilient_community

https://www.who.int/initiatives/decade-of-healthy-ageing

https://www.jeffsachs.org/

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Table 1. Social and environmental determinants of health and health outcomes across the High Country compared to state of North Carolina (2020 County Health.

	Alleghany County	*Ashe County*	*Avery County*	*Mitchell County*	*Watauga County*	*Wilkes County*	*Yancey County*	*North Carolina*
Demographics:								
Population	11,161	27,109	17,505	15,000	55,945	68,557	17,903	10,383,620
% below 18 years	17.4%	17.6%	15.0%	18.3%	12.8%	20.5%	18.3%	22.2%
% 65 and older	27.1%	25.7%	22.2%	24.9%	15.8%	21.6%	25.7%	16.3%
% White	86.4%	92.9%	88.5%	91.8%	91.6%	86.9%	92.2%	62.8%
% Black	1.6%	0.7%	4.4%	0.5%	1.7%	4.3%	0.8%	21.4%
% AI/AN	0.6%	0.4%	0.6%	0.9%	0.4%	0.4%	0.8%	1.6%
% Asian	0.8%	0.6%	0.6%	0.7%	1.2%	0.6%	0.3%	3.2%
% N Haw/PI	0.0%	0.1%	0.1%	0.2%	0.0%	0.1%	0.3%	0.1%
% Hispanic	9.9%	5.2%	5.2%	5.8%	3.7%%	6.8%	5.5%	9.6%
% Females	50.5%	50.9%	45.6%	50.7%	50.1%	50.8%	50.8%	51.4%
% Rural	100.0%	84.9%	88.8%	82.6%	55.4%	72.8%	100.0%	33.9%
Social & Economic Determinants:								
High School grad	92%	87%	94%	85%	90%	88%	92%	86%
Some college	43%	60%	55%	57%	78%	56%	58%	67%
Unemployment	4.5%	3.6%	3.6%	4.5%	3.5%	3.7%	3.6%	3.9%
Children in poverty	30%	26%	25%	24%	15%	32%	26%	20%
Income inequality (80^{th} percentile to 20^{th} percentile ratio)	4.4	4.5	4.4	4.6	6.9	4.9	4.4	4.8
Single-parent house	40%	34%	36%	26%	23%	30%	23%	35%
Median household income	$39,700	$41,900	$41,700	$44,000	$48,500	$44,100	$44,800	$53,900
Children eligible free or reduced lunch	65%	57%	58%	54%	34%	81%	51%	56%
Suicides (deaths per 100,000)	27	17	15	26	15	20	20	13
Environmental Determinants:								
Air pollution – particulate matter	8.7	8.5	8.5	8.5	8.3	9.6	8.6	9.8
Drinking water violations	Yes	No	No	No	Yes	No	No	--
Severe housing problems	13%	12%	13%	14%	26%	14%	13%	16%
Home ownership	75%	75%	75%	80%	61%	74%	74%	65%
Severe housing cost burden	13%	9%	14%	12%	20%	12%	11%	13%
Health:								
Premature death (death before age 75 per 100,000)	8,200	7,400	7,900	8,900	5,100	9,500	7,400	7,700
Poor or fair health	19%	16%	17%	16%	18%	18%	18%	18%
Poor physical days (last 30 days)	4.4	4.1	4.1	4.0	4.3	4.3	4.3	3.9
Poor mental health days (last 30 days)	4.4	4.1	4.1	4.1	4.6	4.3	4.4	4.1
Life expectancy	78.2	78.7	77.8	76.3	82.0	76.5	78.4	78.0
Frequent physical distress (≥14 days/month)	14%	13%	13%	12%	14%	13%	13%	13%
Frequent mental distress (≥14 days/month)	14%	13%	13%	13%	14%	14%	14%	13%
Diabetes	11%	17%	18%	17%	7%	14%	18%	11%
Smoking	17%	17%	17%	16%	18%	18%	17%	17%
Obesity	26%	26%	27%	27%	17%	43%	30%	31%
Food environment index (1-10)	8.0	8.1	8.4	--	7.3	7.6	8.1	6.7
Physical inactivity	26%	31%	29%	26%	19%	32.2%	31%	24%
Access to exercise opportunities	27%	59%	100%	100%	92%	74%	100%	74%
Excessive drinking	14%	15%	17%	16%	19%	15%	15%	17%
Food insecurity	14%	13%	12%	12%	17%	14%	14%	15%
Drug overdose deaths (per 100,000)	--	16	19	--	8	35	23	22
Insufficient sleep	33%	32%	31%	31%	32%	34%	30%	34%
Uninsured	18%	16%	20%	14%	14%	16%	15%	13%
Primary care physicians	920:1	2,250:1	3,510:1	1,670:1	1,340:1	2,450:1	1,480:1	1,410:1
Dentists	5,580:1	2,710:1	3,500:1	1,670:1	1,650:1	2,980:1	3,580:1	1,780:1
Mental health providers	450:1	600:1	240:1	1,250:1	250:1	530:1	530:1	410:1
Preventable hospital stays (per 100,000 Medicare enrollees)	5,181	3,937	3,948	2,077	3,281	4,837	1,807	4,758
Mammography screening	44%	44%	35%	42%	44%	48%	41%	46%
Flu vaccinations	53%	52%	47%	40%	52%	51%	37%	51%
Other primary care providers	1,860:1	1,291.1	1,945:1	600:1	1,036:1	1,224:1	1,194:1	801:1

While hunger and poverty are central issues across Appalachia and the High Country, other very pertinent social inequities that serve as root causes of health disparities include education/educational attainment, employment and workforce opportunities, and the impacts that each can have on both families and communities. According to the aforementioned Health Disparities in Appalachia report, the region experiences lower rates of post-secondary education; and the Southern and Central sub-regions experience even lower rates. Within the disparities are major differences between rural and urban areas; with the High Country being overwhelmingly rural, the rates are lower as well, particularly in the more rural counties. In addition, those living in rural areas often have to travel further for work and could experience transportation barriers, while also working in occupations that have limited income opportunities. Specific to the High Country, as found in Table 1, the counties tend to be much older in nature; and the younger populations tend to move away for work. While the high school graduation rates are fairly good across the counties, outside of Watauga County where Appalachian State University is located, there are relatively lower rates of some college attainment. Reed-Ashcraft[39] and her colleagues delve into the intergenerational impacts that these experiences can have on children throughout their lifespan, including mental health concerns.

Environmental determinants of health

Without doubt, the biggest global environmental health challenge facing the world, is climate change. The world's rapidly changing climate affects us all and can have major implications for infectious disease patterns, food insecurity and hunger, drinking water and air quality.[40] Much of this is driven by human behavior in the forms of energy we demand and consume and the importance of it to our economic development. As seen in Figure 4, climate change and the environment around us can have severe immediate or long-term and direct threats to human health, such as through natural disaster and extreme weather events (flooding, heat/cold, hurricanes, etc.), housing conditions, and air and water pollution, among others. These threats can result in health implications to include increases in injury risks, certain forms of cancer, heart and lung disease, and exacerbated challenges with mental illness. In addition, the conditions can make certain populations and geographic locations more vulnerable to the many health risks. This could include those with increased poverty rates and older populations, a limited infrastructure and capacity for prevention and mitigation efforts, and other underlying social inequities.

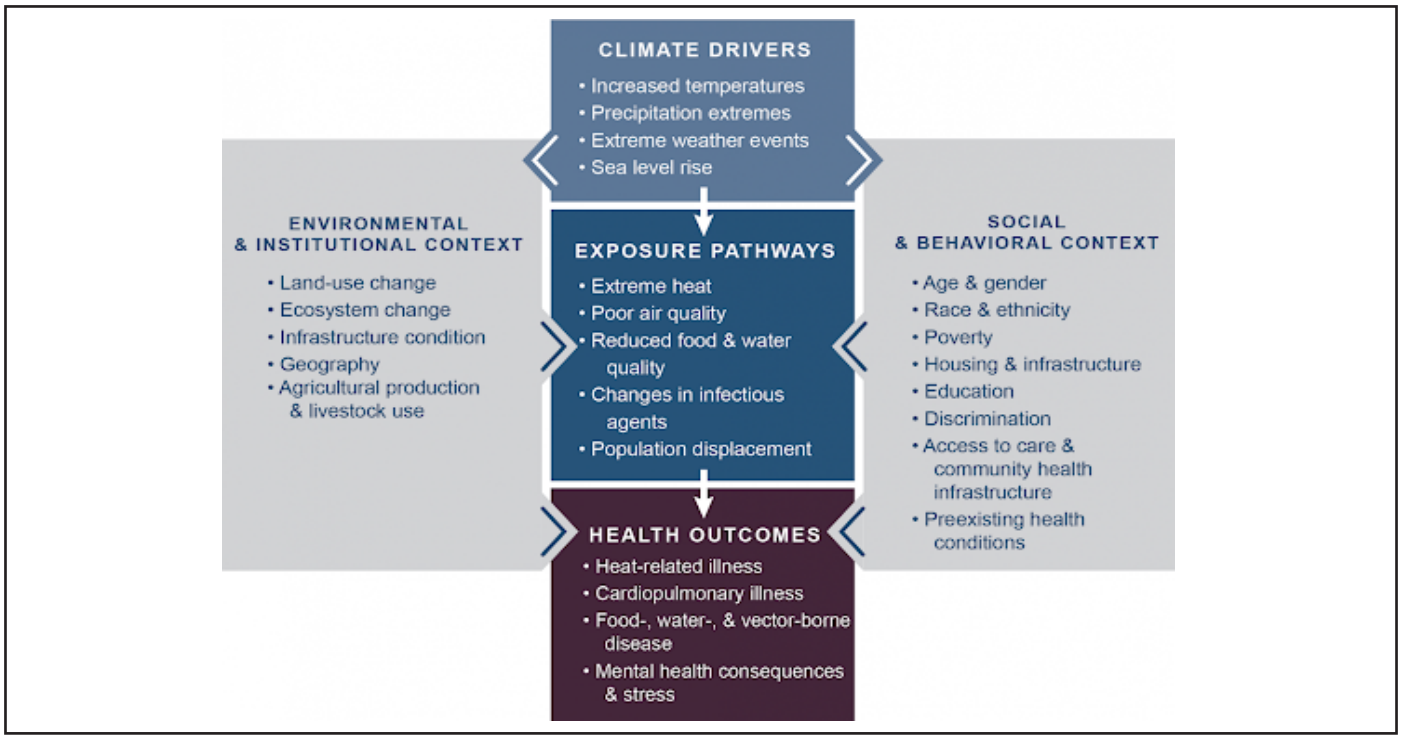

Figure 4. The Impacts of Climate Change on Human Health.41

Across Appalachia, and in particular the central and southern portions, there have been numerous factors that directly affect environmental health disparities. In particular, Krometis and colleagues[42], describe the role that coal mining and natural gas extraction have played over the last several decades across the region. These are significant economic engines in the region that will require complex systems changes to move away from these sources of energy production. Another plausible environmental health concern for air quality is the higher rates of tobacco use and smoking, which has also been associated with numerous effects on human health. The region is also experiencing many of the ongoing changes to air quality stemming from global climate change. As such, air quality and lung-associated health issues have been major issues. Additionally, water quality and safe drinking water have been notable challenges, due in large part to the higher rates of private drinking water systems, such as wells, and the impacts that mining and other activities, such as agriculture, can have in the form of runoff. There are also concerns over the impacts global climate change will have on agricultural production and food security/hunger issues across the region.

Specific to the High Country, air pollution in the form of particulate matter is relatively low when compared to North Carolina in general. This is likely due to the rural context, less traffic congestion, and lower levels of harmful substances released into the air. Of the seven counties, only two (Alleghany and Watauga) have had drinking water violations in the past year. Housing appears to be relatively stable outside of Watauga County, which faces challenges with the large university student population; in fact, there are much higher rates of severe housing problems, lower rates of home ownership, and severe cost burdens found in Watauga. Sugg and colleagues[43] further examine the climate and environmental determinants of health in their article and highlight the High Country.

Good health and well-being

As aforementioned in the introduction of this paper, the Appalachian region performs much poorer in terms of health behaviors and health outcomes when compared to the rest of the U.S. Much of this is, of course, due to underlying social and environmental inequities and limited attention and focus on the driving forces of poor health. Specific to the High Country, there are several health behaviors and outcomes that stand out and are in dire need of intervention and policy support. When compared to the state of North Carolina, each of the High Country counties have slightly higher numbers of poor physical and mental health days per month. Outside of Watauga County the region has significantly higher rates of diabetes, physical inactivity levels, and access to exercise opportunities. In their article, Towner and colleagues[44] delve into their interdisciplinary work and approaches through the HOPE Lab at Appalachian State University aimed at promoting physical activity and exercise through outdoor play and taking advantage of all of the beautiful scenery that is found in the High Country. Healthcare and access to healthcare resources are a serious challenge across the High Country, with higher rates of uninsured and access to practitioners due to a shortage, particularly when it comes to dentistry and mental health needs. As Reed-Ashcraft and colleagues[39] describe, it takes a lot of collaboration and sustained trust across the communities to meet the unique needs of the High Country citizens.

Governance/trust in institutions/assets/partnerships

Effective and sustainable partnerships and good governance are vital to addressing systemic social, economic, environmental, political, and health inequities across the world, U.S., Appalachia, and the High Country. Unfortunately, across much of the United States and world at large, there is a large public distrust of governments at all levels and institutions in general. This has amplified over the past couple of decades and leads to serious challenges in being able to solve some of the world's most complex challenges, which are all found within the SDGs. It creates challenges to being able to develop effective partnerships and to build the political will for changes that are needed. In particular, research from Pew[45] has found growing distrust in scientists, politicians, the media, and governments at all levels and that we have increasingly become more politically partisan. Therefore, one of the great challenges of the 21st century is in recapturing this sense of trust in public officials, institutions, and governments and the pursuit of the common good.

In Appalachia, the Appalachian Regional Commission[46] (ARC) serves as a regional economic

development agency for Appalachia and represents a partnership between the federal, state and local governments across the region. As a part of this, the members and partners within ARC include the governors from the 13 states, one federal co-chair appointed by the President and much grassroot participation from local governments, multi-county agencies, elected officials, the business community, local leaders, and citizens of the region. With it being a major player across the region, it serves as a central target for improving relations and building trust, as well as improving the quality of life across the region. The current strategic goals include: innovation and economic development; improvement in education and health of workers across the region; infrastructure development (internet, transportation, highways, water systems); using the assets across the region, such as nature and cultural heritage to strengthen community and economic development; and helping to build capacity and the next generation of leaders to advance these goals. ARC is very strategic in their approaches, but they serve as the primary grant-funding support system across the region and fund projects related to development, infrastructure, education, energy, health, tourism development, and transportation, among others. Therefore, ARC is critical to the future sustainable development goals of the region.

When examining things more local to the High Country, the High Country Council of Governments (HCCOG)[47] serves the seven counties and 19 municipalities. It is supported by both state and federal funding to help serve the region and the local governments. As a part of their goals, the HCCOG helps to promote economic development and workforce development needs and to develop partnerships and collaborations within the High Country and beyond to help improve the health, wellbeing and quality of life of citizens. Specific focus areas include community-based services aimed at the older adult population through the High Country Area Agency on Aging, funding for and support of community and economic development initiatives, and helping to develop the future leaders through their workforce development efforts. These initiatives help to address the SDGs and specifically targets SDG #17 along the way, which is vital to the long-term future sustainability efforts. In their article in this volume, McCullough and Bouldin[48] detail how local rural communities, through leveraging collaborative opportunities between the HCCOG and other community assets, can promote more sustainable environments for the aging population. Figure 5 presents a conceptual model of the surrounding factors affecting the health and wellbeing of High Country citizens for the short and long-term futures as well as assets and partnerships and governing characteristics that leaders should capitalize upon in response.

Setting the stage for the following articles in this volume of Sustainable Health

As described in the preceding sections of this article, sustainability, health, and the SDGs are all complex matters that involve complex solutions. These numerous challenges found in the SDGs didn't happen overnight and they're unfortunately not going to be solved overnight. However, in the midst of COVID-19, it has become increasingly evident of our urgent need, both globally and domestically here in the U.S., to address these issues. COVID-19 has taught us how intricately connected we all are as a human race and how dependent upon each other we are for our own individual health and well-being. It takes all of us working together and collective action to have a collective impact. As Diez Roux[22] recently expressed, "the pandemic may be producing unanticipated opportunities for population health, by illuminating (in ways that were often unintended) how we can use our power as a society to change the way we live and to create systems and environments that promote health and health equity…It's time for us to be open to re-envisioning what a healthier society would like."

While the challenges before us are daunting, the High Country is well-equipped and has the tools necessary to be a leader in creating a sustainable health system for all. It doesn't mean we can do "business as usual", but we can build upon the assets and opportunities that are found right in our midst. The roots for change, however, are all around us. The High Country is home to some of the best teachers, educators and school systems, has high levels of social cohesion, social capital and trust, has beautiful nature and tourism opportunities, has faith-based institutions engaged in and committed to service in their communities, and has numerous not-for-profit agencies addressing the many health and social challenges facing residents. To add to it, Appalachian State University employs faculty and staff committed to community-engaged research and service and

possesses the skillsets and expertise to take on and lead in many initiatives aimed at addressing SDG focus areas. In addition, the faculty are training their students to do like-wise and to prepare them to employ both empathy and critical thinking aimed at improving the quality of life for future generations to come. Appalachian State University further has sustainability as a primary pillar, and it is interwoven into much of the university's strategic plan. The university has two large research institutes in theResearch Institute for Environment, Energy, and Economics (RIEEE) and the Blue Cross NC Institute for Health and Human Services that can help to spearhead university-community collaborative opportunities. The High Country also has its local governmental institutions connected and supported through the High Country Council of Governments, which offers further collaborative opportunities for addressing the SDGs in the local communities. There is no doubting that the High Country has everything that it needs to transform communities and improve the lives of the citizens of this region of North Carolina.

However, at the end of the day, all of our work should and will require university researchers and officials, local leaders (formal and informal), and policymakers all collaborating with the most important piece of the puzzle: the people that we serve. To be sustainable in our approach, it requires us to "go to where the people are" and to "meet people where they are" and to be participatory in our decision-making and in developing solutions. As many in community and sustainable development and public all say: We work with people, not on people. The people all around us, who all have different lived experiences, hold the answers to the challenges – if we are willing to listen, to include, to be transparent, and to be held accountable for responding to the needs of the citizens around us. It is our duty and responsibility do so!

The following articles in this volume all present local and regional work in the areas of sustainability and health from Appalachian State University researchers and community partners. These are all just a glimpse of the work currently being done and the potential for all that can be done moving forward. The volume features Appalachian State researchers from the disciplines of Geography and Planning, Nutrition, Public Health, Communication Sciences and Disorders, Health and Exercise Science, Sustainable Development, Recreation Management, Social Work, Healthcare Management, Sociology, and Global Studies, among others. Contributions from community agencies includes: AppHealthCare (local health department); the North Carolina Institute for Climate Studies; Second Harvest Food Bank of Western North Carolina; Hunger and Health Coalition; Appalachian Regional Healthcare System; Watauga County Schools; Children's Council of Watauga County; Hospitality House; the Area Agency on Aging; and Daymark Recovery Services, among others.

Concluding remarks

In his recent piece COVID-19 and Multilateralism published in Consilience: The Journal of Sustainable Development, notable sustainable development scholar and leader, Jeffery Sachs[49], stressed the critical nature of the world that we live in right now during a global pandemic and the necessity for nations around the world to work collaboratively to address the numerous pressing needs. Specific to the U.S., he said, "we find ourselves in the U.S. in an epidemic, a depression, a geopolitical conflict, and a period of deep instability." We can't continue on this same trajectory.

In this article, I've sought to give an overview of sustainability, sustainable development, and all of the various factors involved in addressing population health and quality of life. The world and country we currently find ourselves in is in dire need of leadership, cooperation and collaboration aimed at alleviating human suffering all around us, globally and domestically. COVID-19 has brought to the forefront the vast inequities, but it has also given us an opportunity to re-envision the world in which we live and the systems in place. Moving forward, it is vital that we use the framework found in the Sustainable Development Goals at a global level but also domestically and in our local communities. The SDGs lay out an invaluable framework for how we as a society can continually improve the human condition – it's our job as global citizens to put it into action and leave the world in a better place for the generation after us.

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